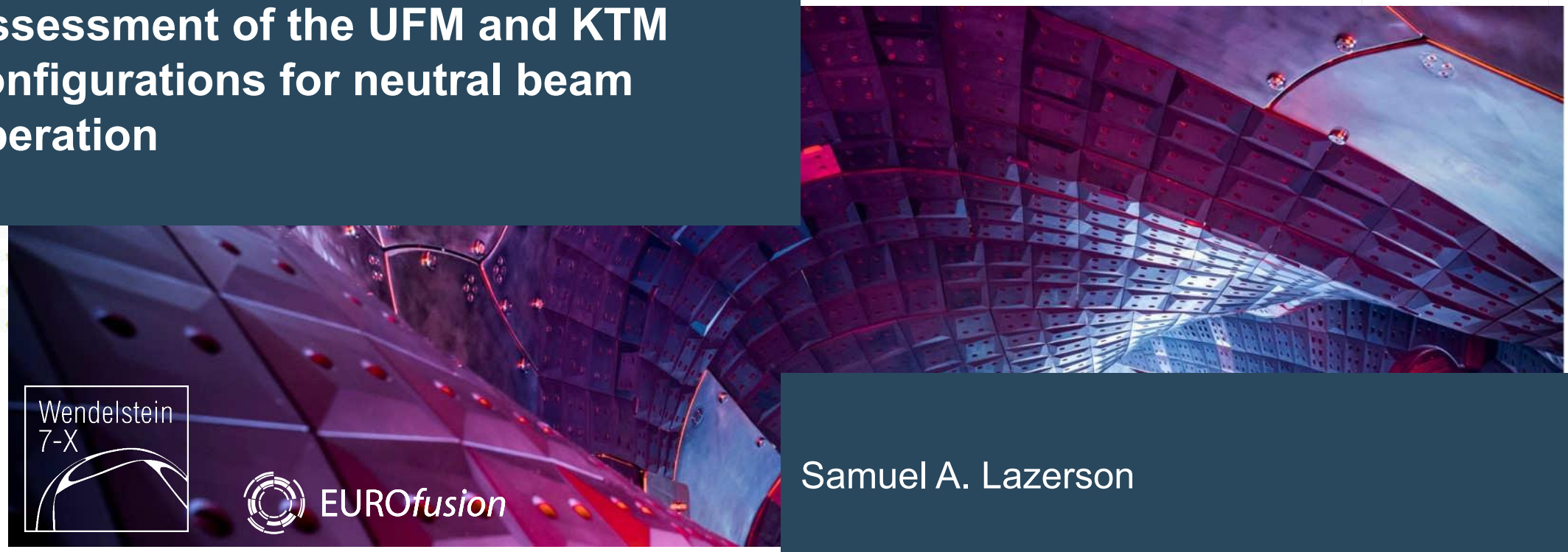
MAX-PLANCK-INSTITUT
FÜR PLASMAPHYSIK

# Assessment of the UFM and KTM configurations for neutral beam operation

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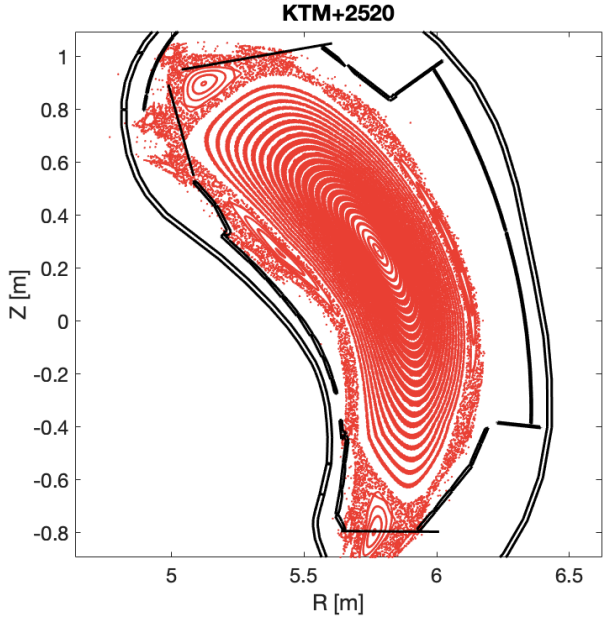
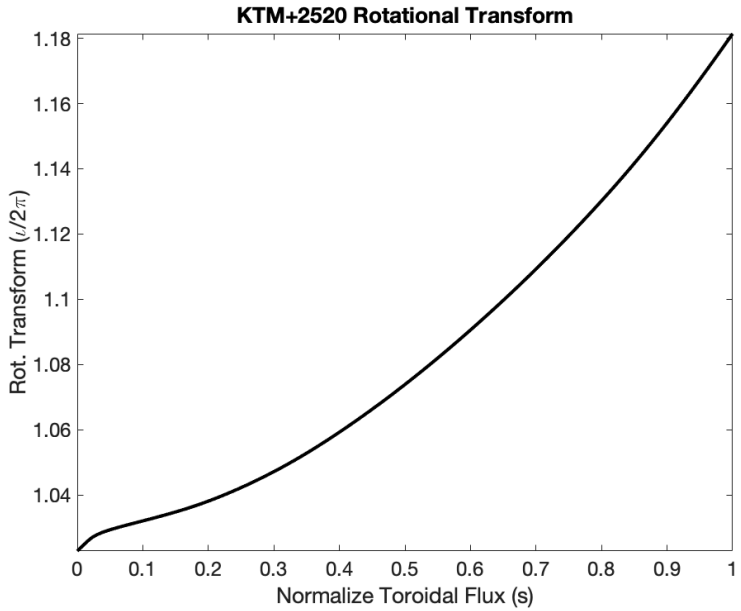
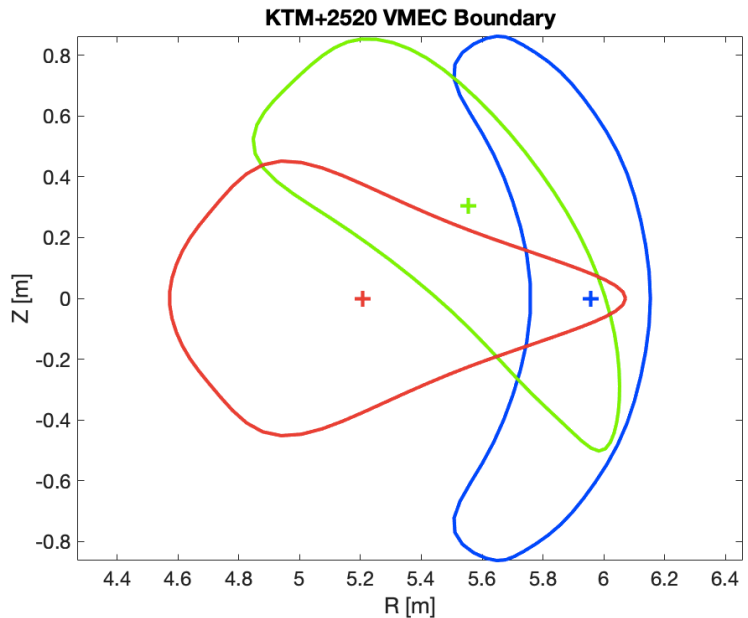
# Introduction to KTM and UFM configurations

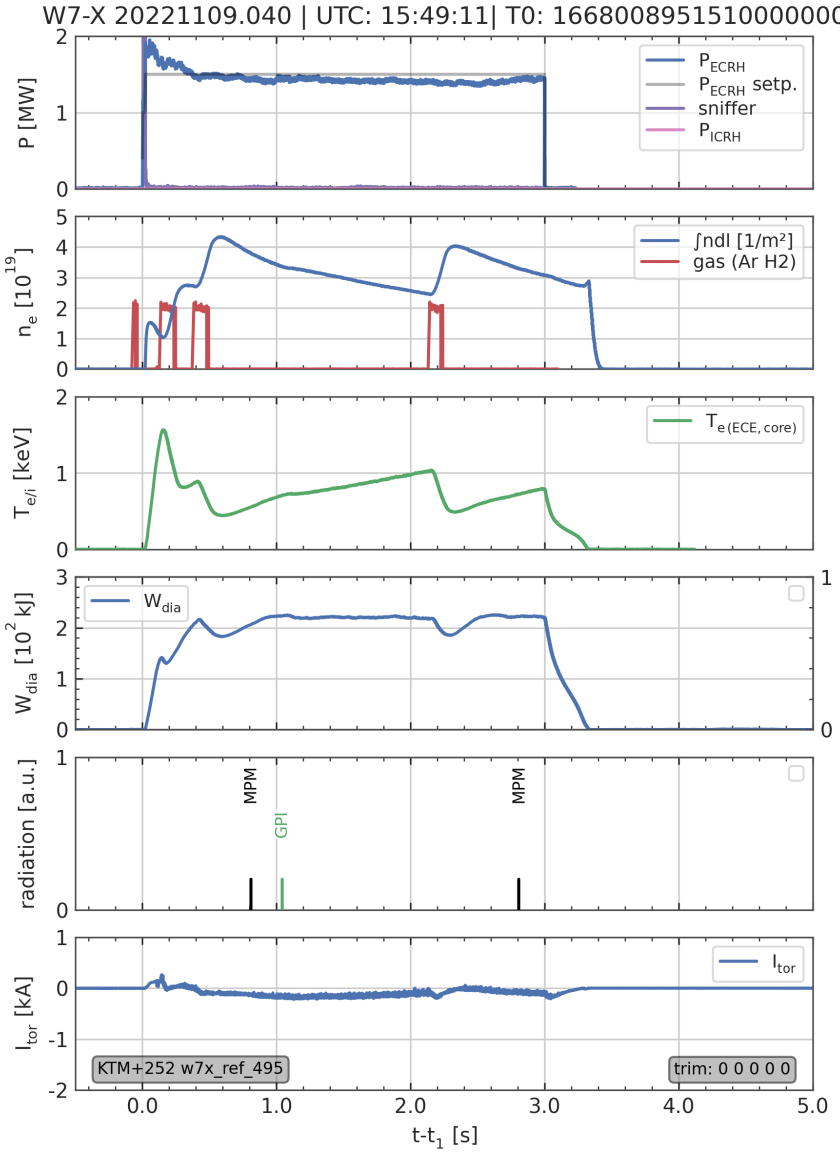
- The High Iota High Mirror Magnetic  configuration (KTM+2520)
  - Ran briefly in OP2.1 during commissioning very low bootstrap
  - Proposed for measuring current drive (NBI)
- The Low Iota Low Mirror Magnetic configuration (UFM+1700)
  - MHD unstable configuration (MHD stability)
  - Maximum-J flat mirror configuration (Fast ions)
  - Low Field configuration

# The High Iota High Mirror (KTM+2520) configuration



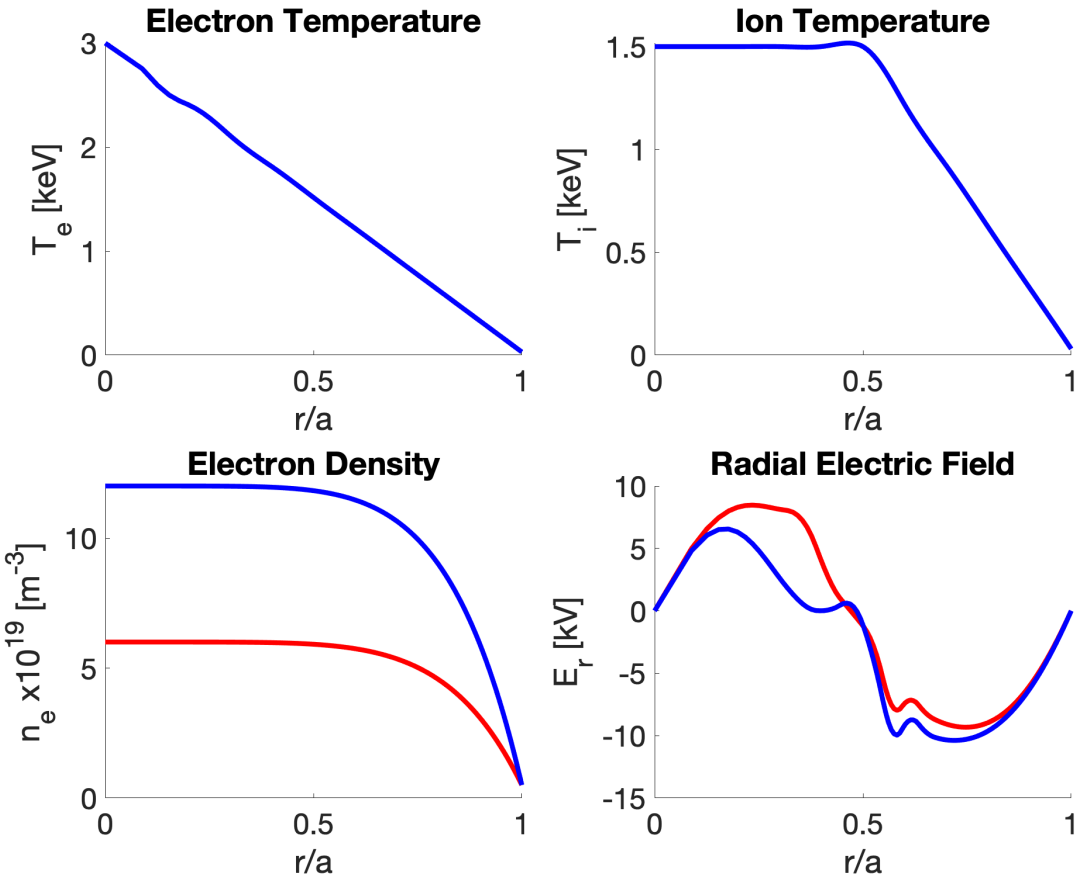



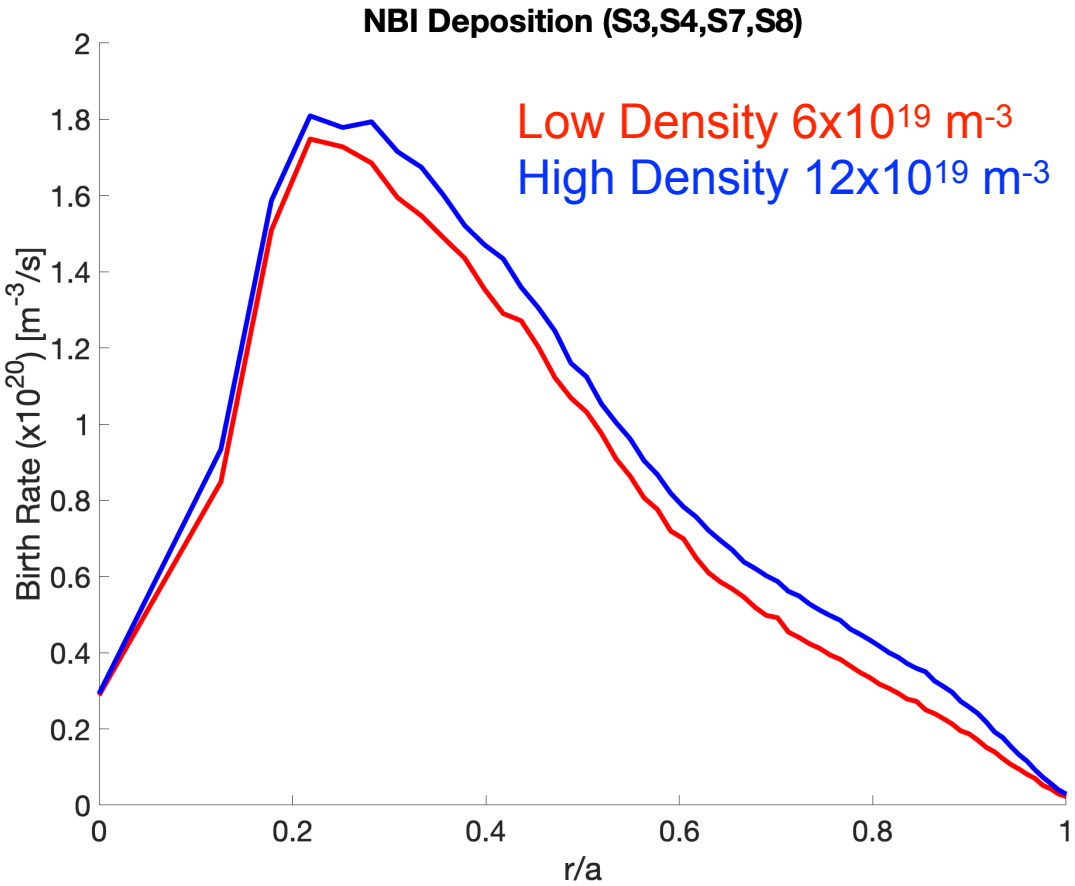



# Neutral beam deposition for KTM+2520

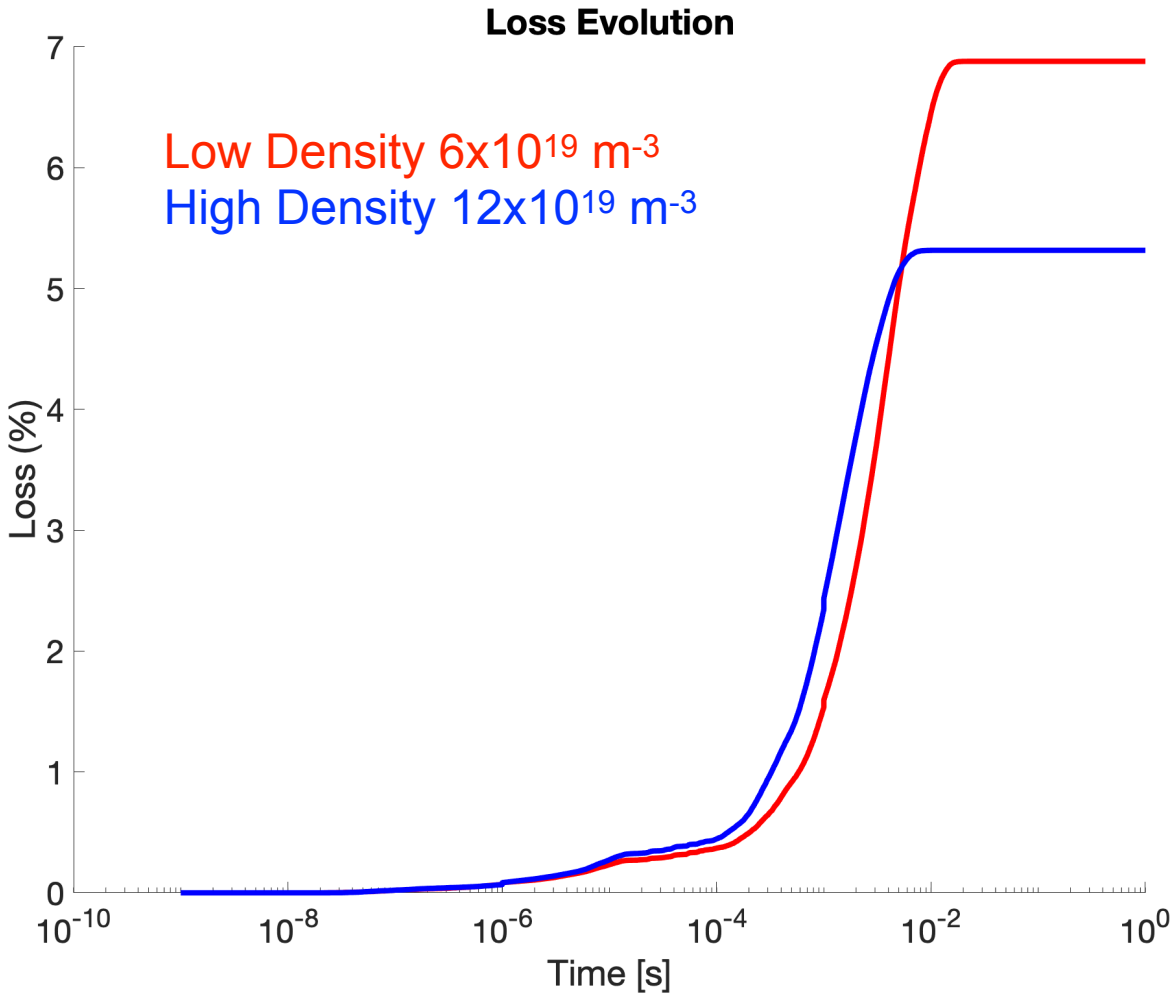
- Two densities considered
- Assume ion clamping (ECRH discharge)

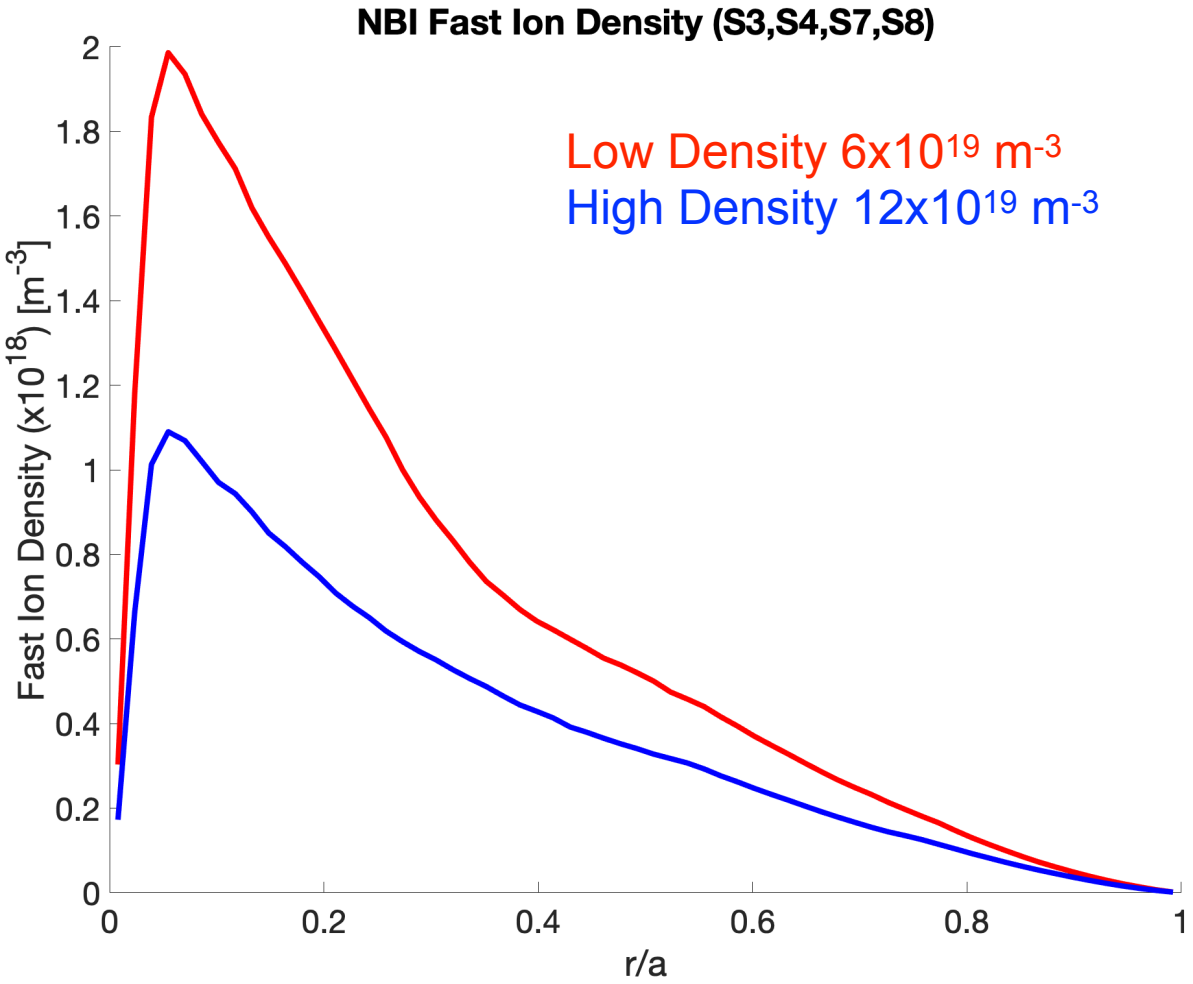


# NBI confinement for KTM+2520

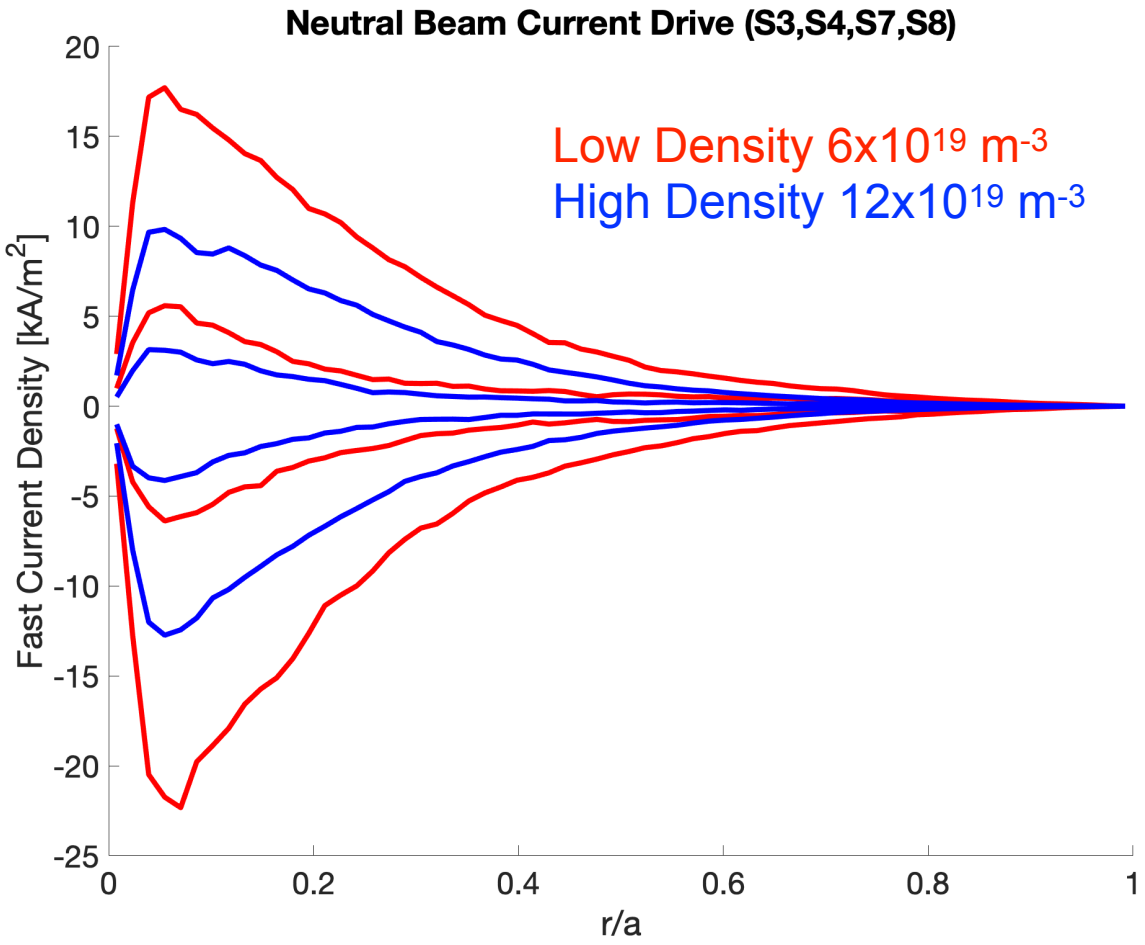
- **Relatively good confinement**

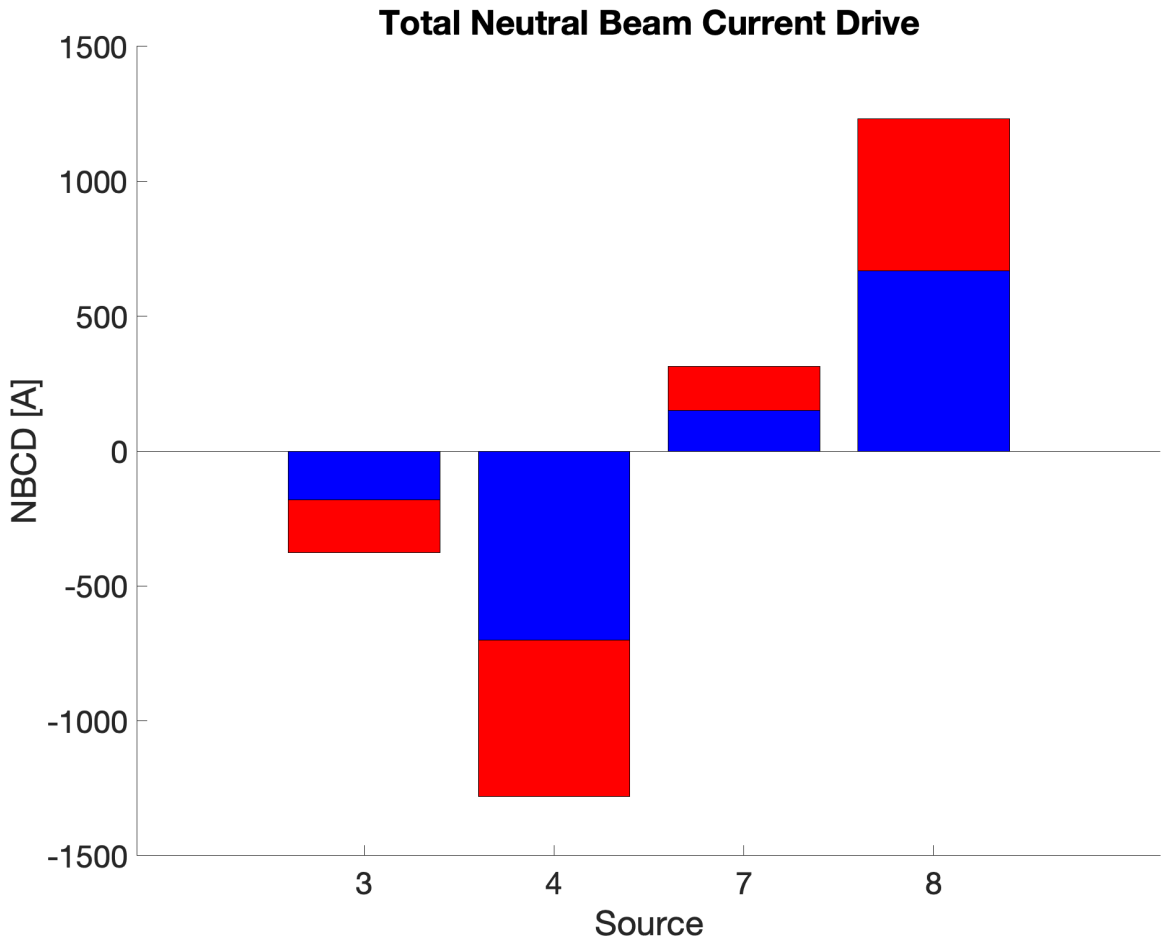


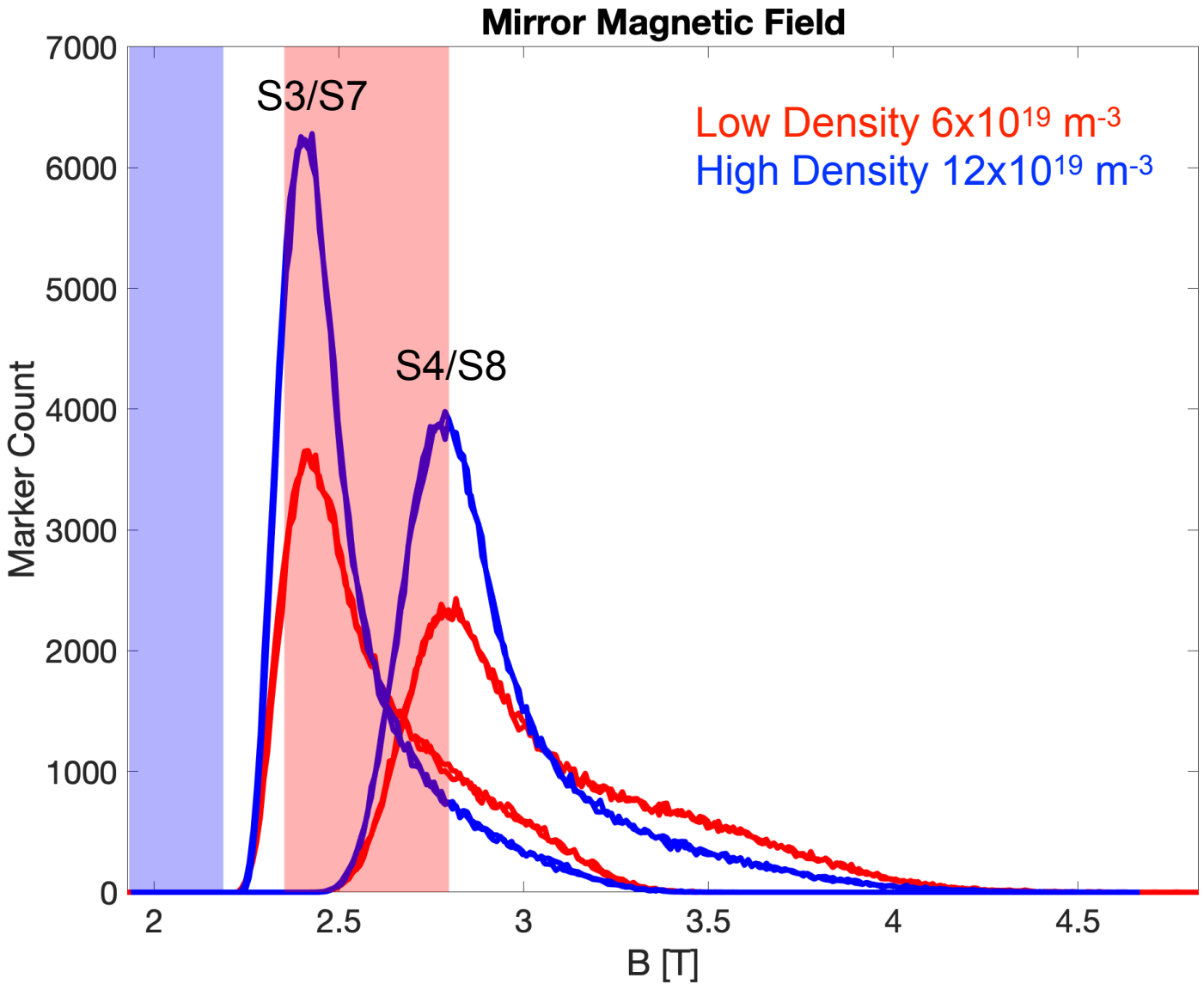
# NBI current drive KTM+2520

- **Neutral beam current drive should be measurable**

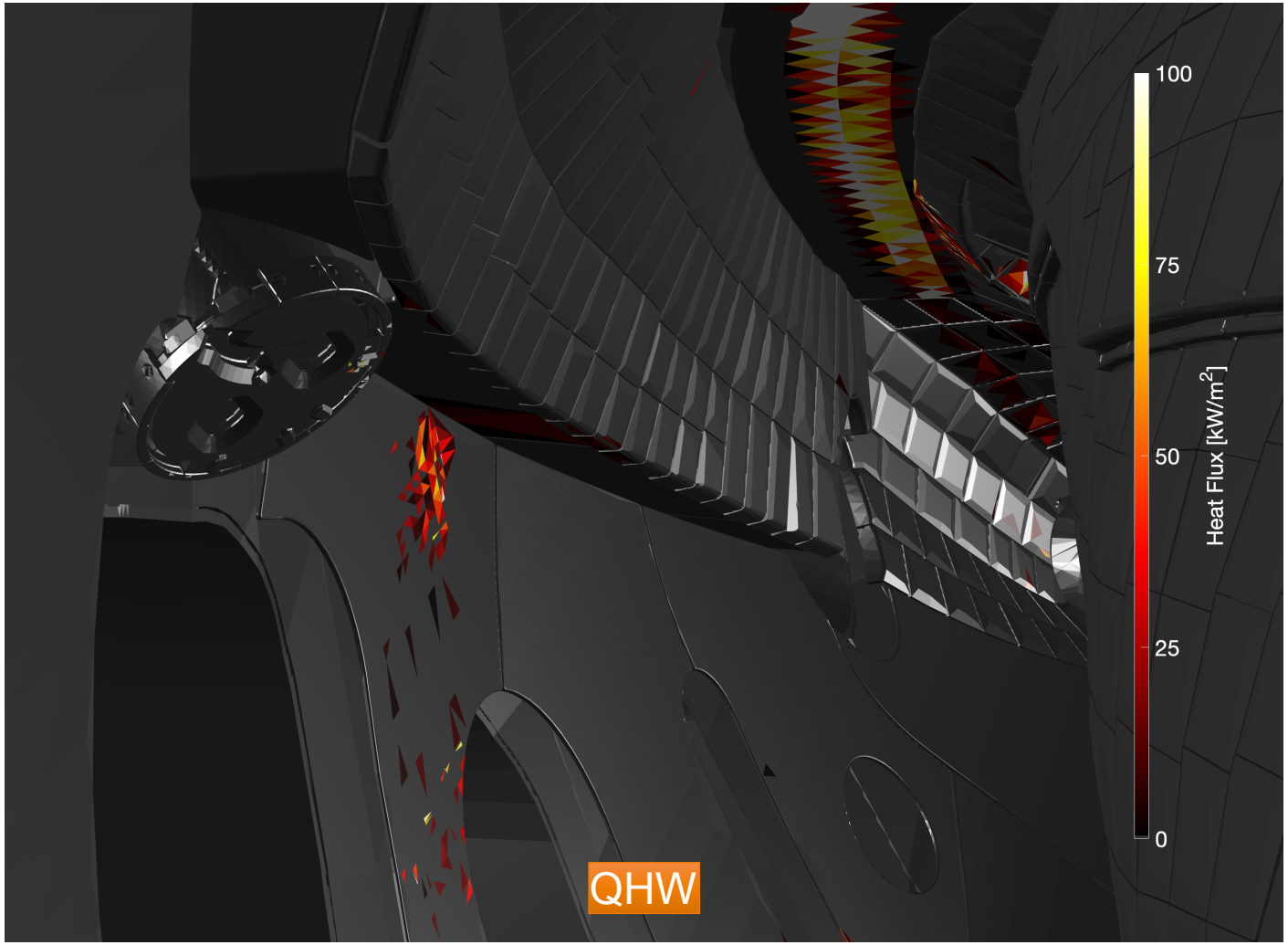


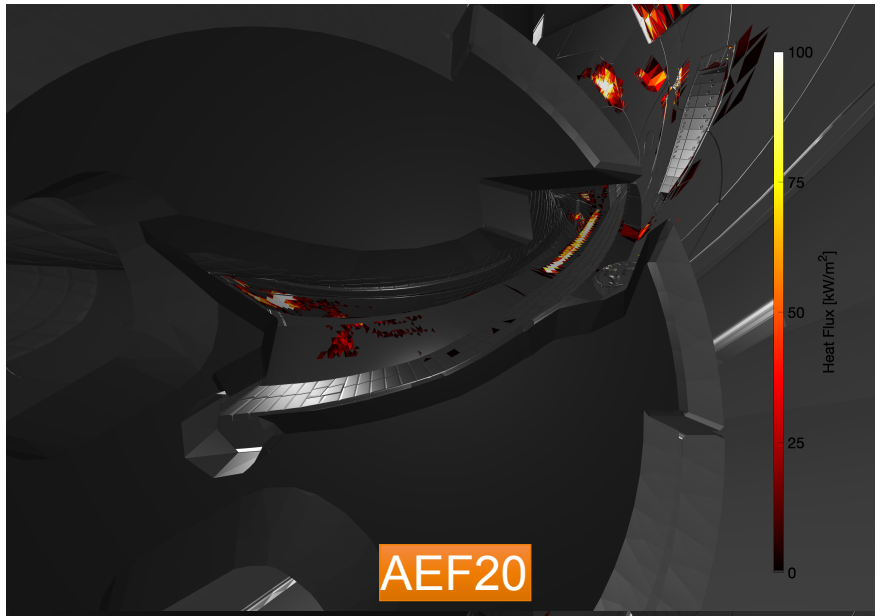



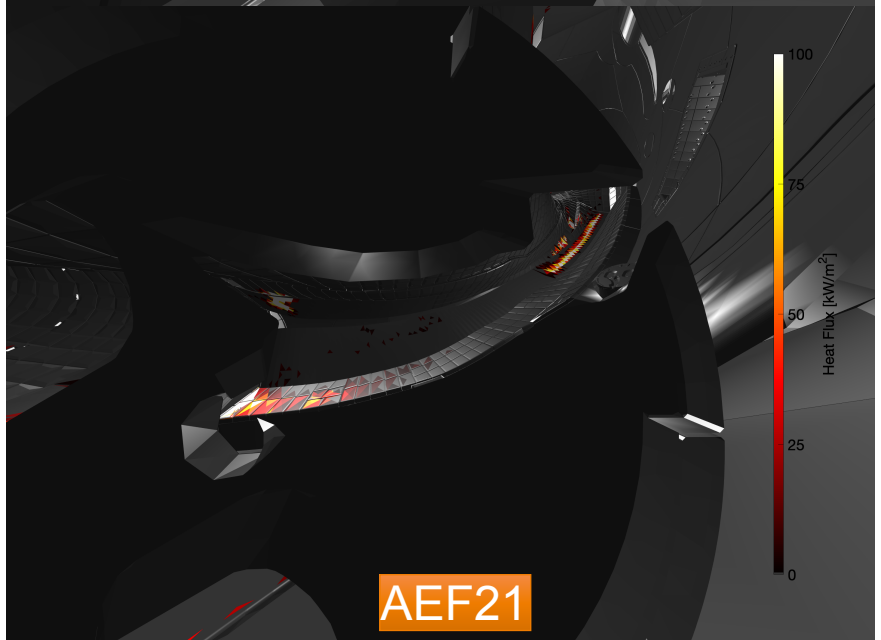
# Mirror magnetic field shows both passing and trapped particle generation



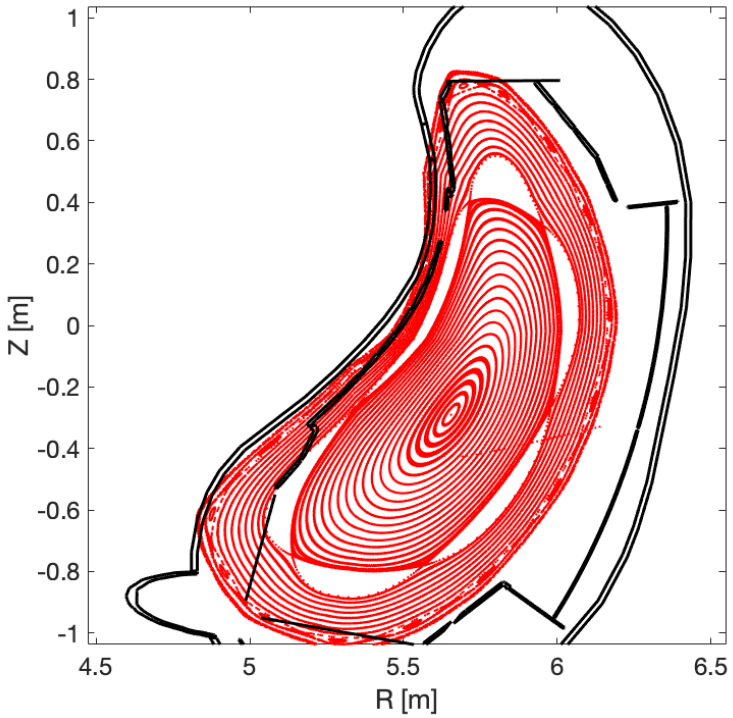
# Wall loads are small in KTM+2520

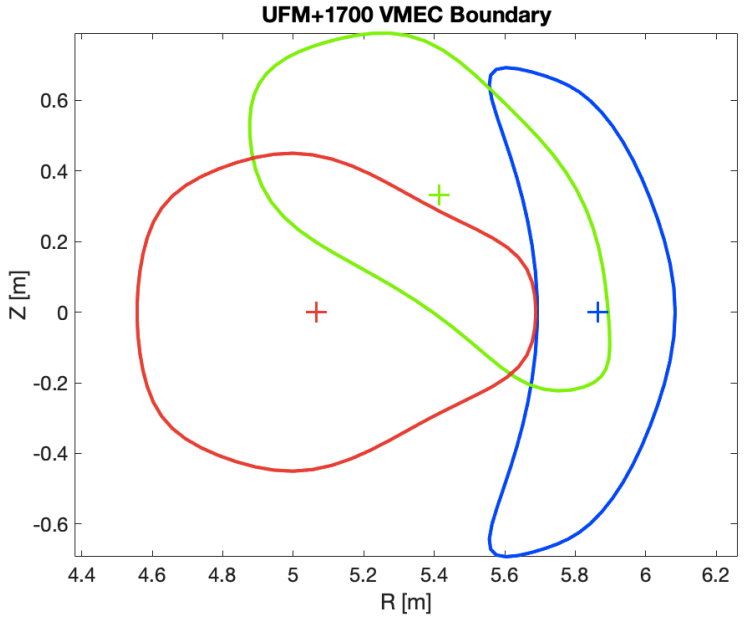


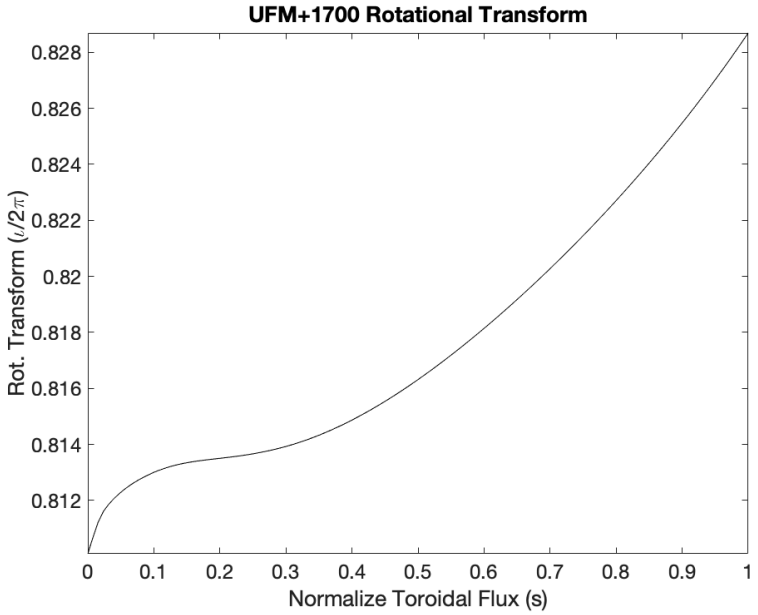



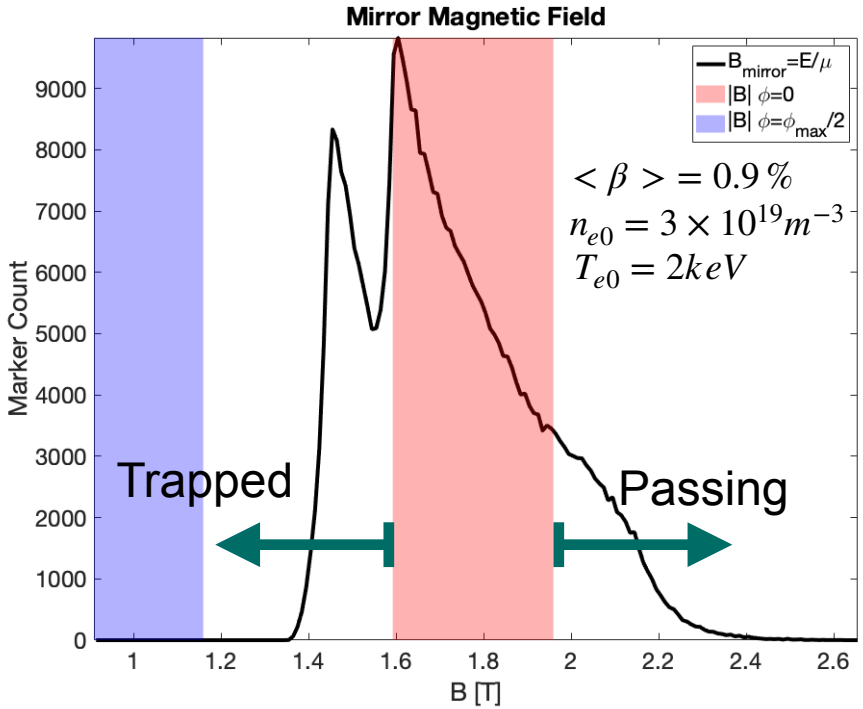



# The Low Iota High Mirror (UFM+1700) configuration



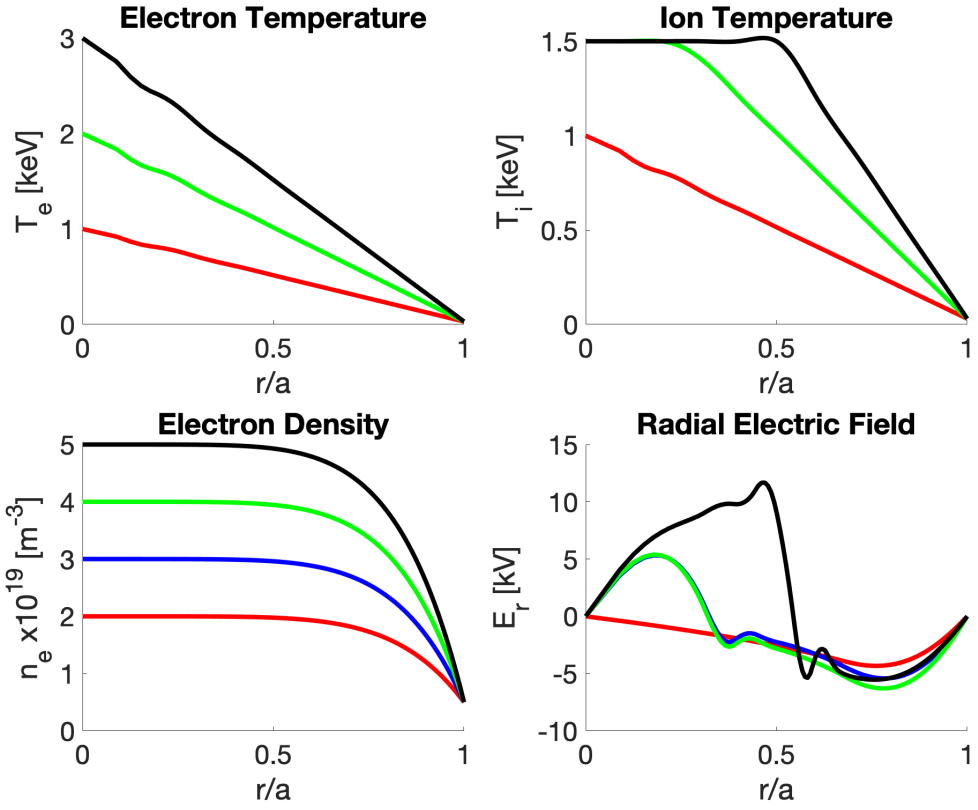



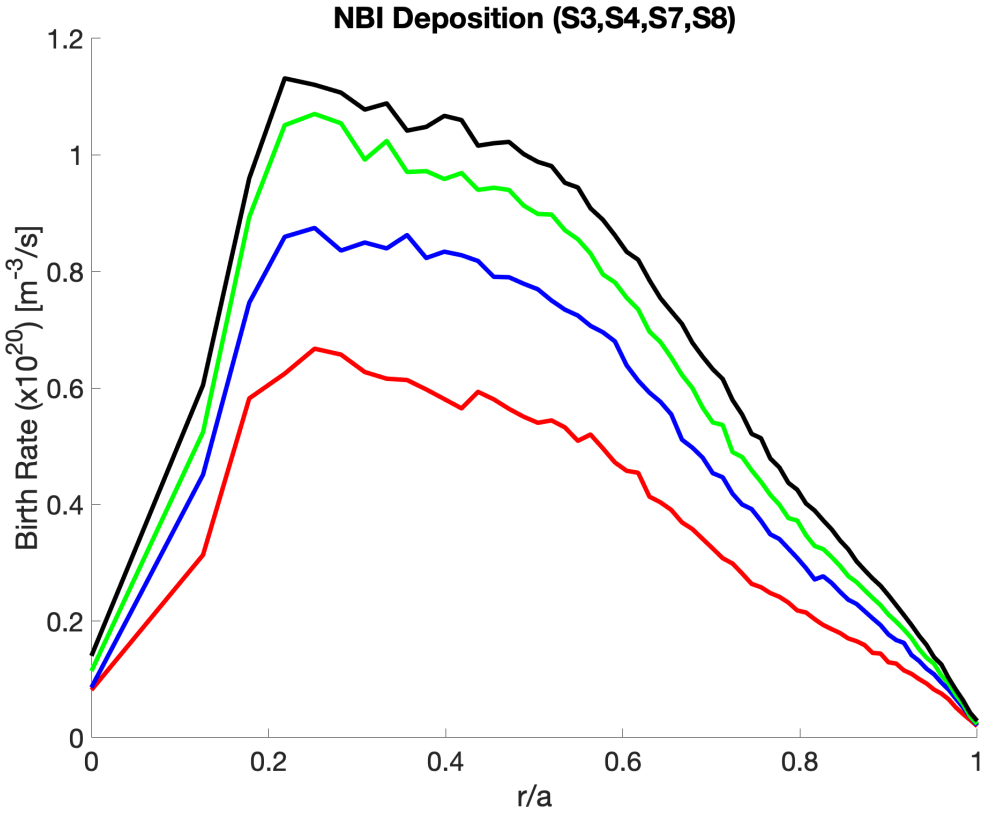



# Neutral beam deposition for UFM+1700

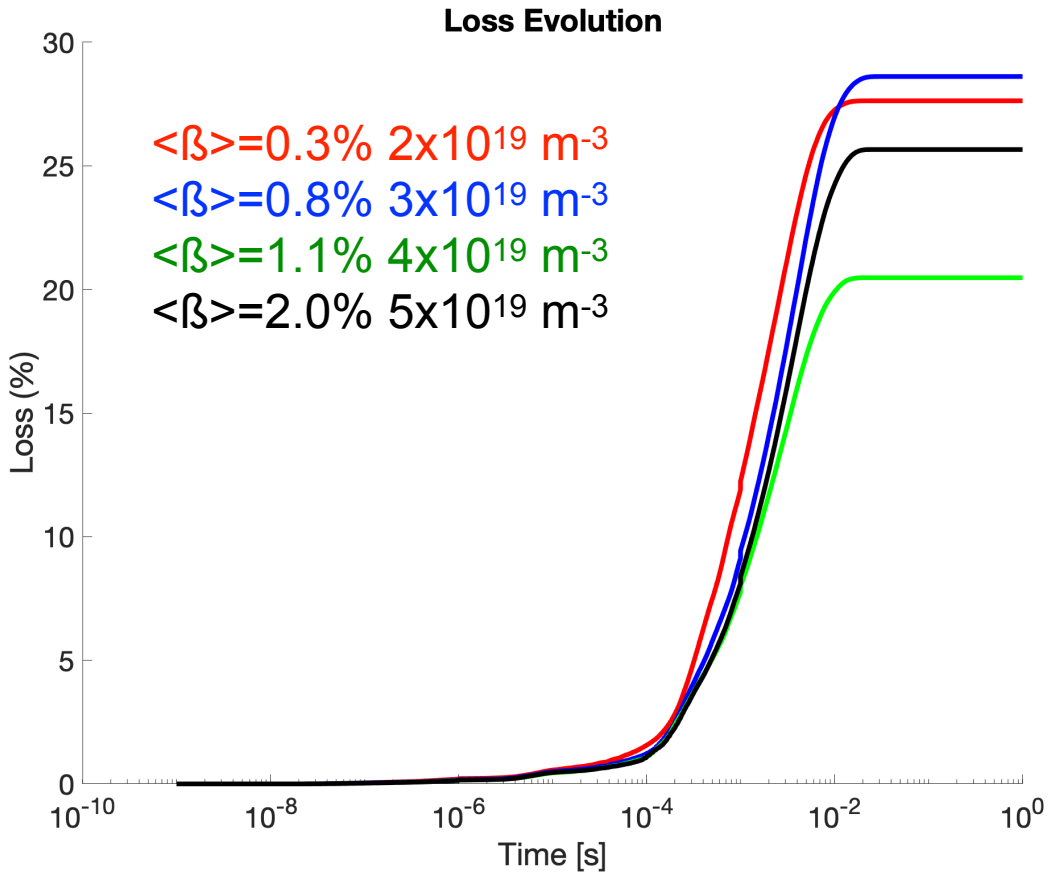
- Four beta scenarios examined
- Assume ion clamping (ECRH discharge)

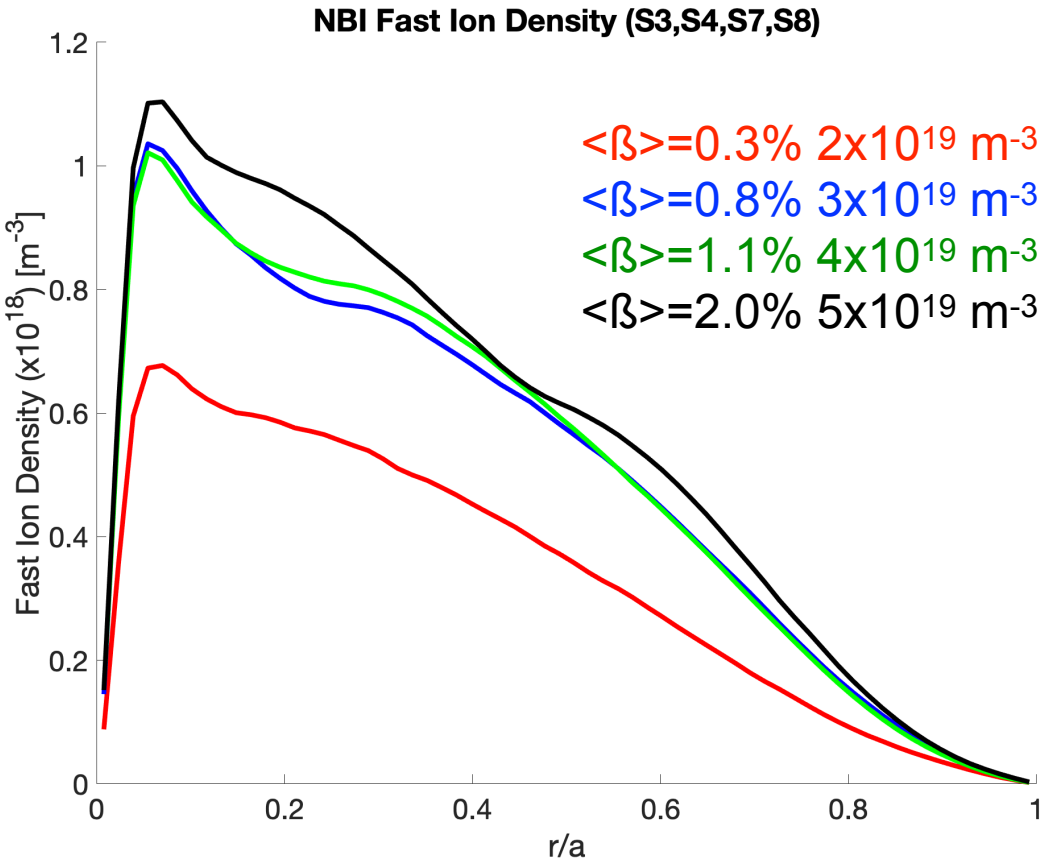
<ß>=0.3% 2x10$^{19}$ m$^{-3}$
<ß>=0.8% 3x10$^{19}$ m$^{-3}$
<ß>=1.1% 4x10$^{19}$ m$^{-3}$
<ß>=2.0% 5x10$^{19}$ m$^{-3}$



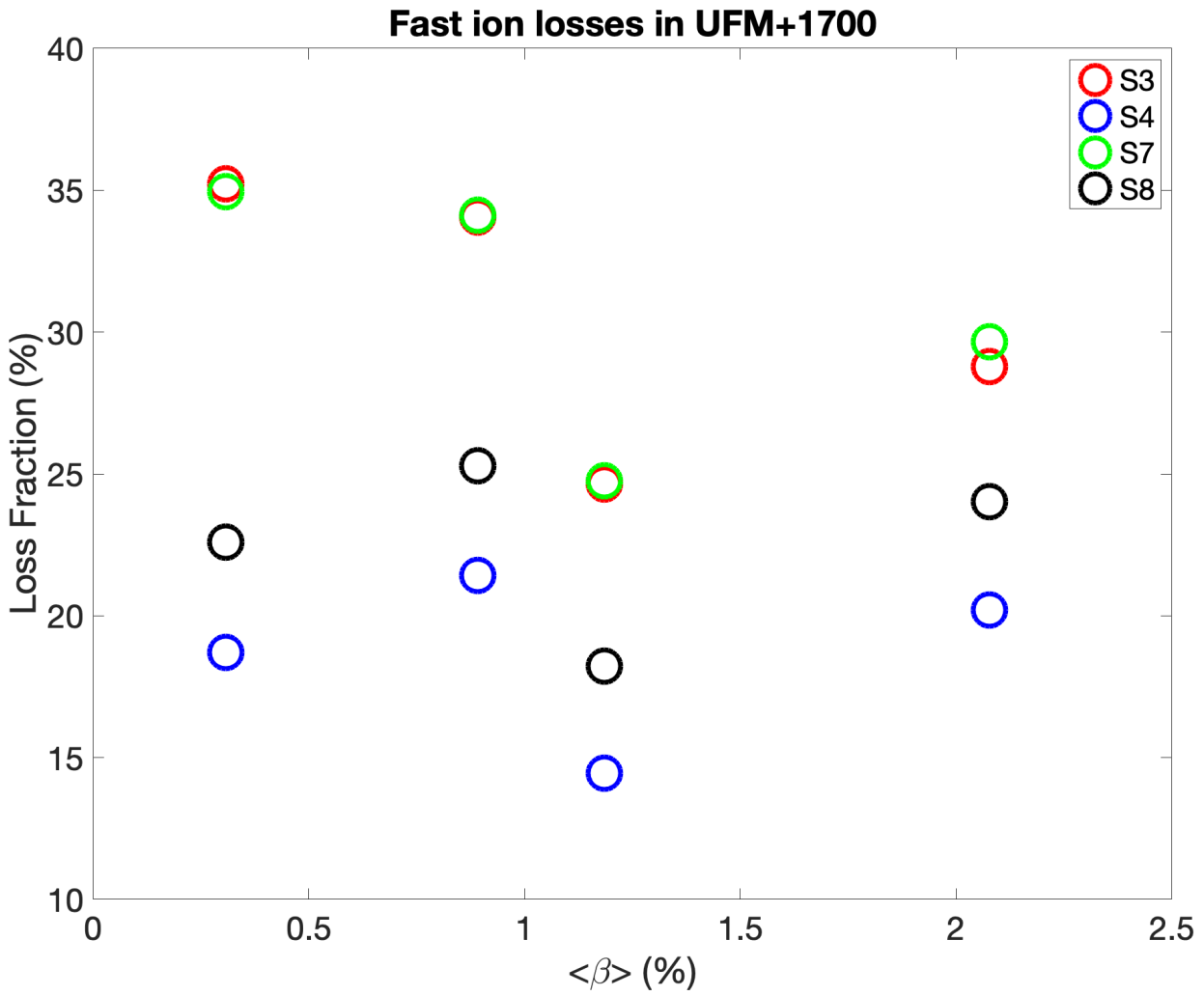
# NBI confinement for UFM+1700



# Breakdown of confinement by beam

- S3/S7 populate some trapped orbits
- S4 and S8 show differences in passing confinement across parameters
- Some evidence of improvements in trapped confinement with beta
- More work necessary to show this is in fact due to maximum-J behavior



# Conclusions

- The High Iota High Mirror Magnetic  configuration (KTM+2520)
  - Shows very good fast ion confinement
  - Provides a good testbed for validating NBCD simulations and MSE measurements
  - Wall loads very los
- The Low Iota Low Mirror Magnetic configuration (UFM+1700)
  - Confinement levels similar to high mirror and standard configuration
  - Evidence of improving trapped ion confinement with beta.